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(54) BATTERY CASE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a battery case formed with a laminated film, thin and light and having high barrier property against a steam or the like and superior resistance to an electrolyte or an acid and thermal adhesion, and being suited to a lithium polymer battery.

SOLUTION: This laminated film 50 for a battery is formed with an substrate layer 1, an adhesive layer 4a, an aluminum foil layer 2 and a thermally adhesive resin layer 3 laminated sequentially from the outside. Other intermediate or dry-laminated adhesive layers are removed from the inside of the aluminum foil layer, as much as possible, to prevent permeation of steam from the end face, and the laminated film is heat-sealed to produce the battery case. At this time, the thermally adhesive resin layer at the heat-sealed portion is compressed in heat sealing, until its thickness is reduced as compared to that prior to sealing.

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CLAIMS

[Claim(s)]

[Claim 1] A base material layer, an aluminum foil layer, an interlayer, and a heat adhesive property resin layer at least the laminated film which comes to carry out a laminating to order from an outside In the container for cells which heat seals superposition and its edge section to saccate, and is formed so that these heat adhesive property resin layers may counter The interlayer inside the aluminum foil layer of this laminated film is removed. The inside of an aluminum foil layer The container for cells characterized by being formed in an adhesives layer and a heat adhesive property resin layer, and being formed so that the thickness of the heat adhesive property resin layer of the heat-sealing section of the edge section of this laminated film may be compressed with heat sealing and may become thinner than the thickness before heat sealing.

[Claim 2] The container for cells according to claim 1 characterized by removing further the adhesives layer inside the aluminum foil layer of said laminated film, and forming the inside of an aluminum foil layer in the heat adhesive property resin layer.

[Claim 3] The container for cells according to claim 1 or 2 characterized by forming the heat adhesive property resin layer of said laminated film in the independent layer of polypropylene or acid denaturation polypropylene, or both compound layer.

[Claim 4] The container for cells according to claim 1 to 3 characterized by the thing of the aluminum foil layer of said laminated film done for the chromate treatment of the inside field at least.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] About the container for cells used in order to contain the component of a cell inside and to form a cell, this invention has the barrier nature of a steam and others it is thin and light and advanced in more detail, and relates to the container for cells which can be used suitable also for containers, such as a lithium-polymer battery.

[0002]

[Description of the Prior Art] Conventionally, the metal container was used for the container used as the sheathing material of a cell when the most. However, while the thin-shape-izing and lightweight-izing are advanced with development of various kinds of electronic equipment, such as a notebook sized personal computer and a cellular phone, and spread, thin-shape-izing and lightweight-ization are called for so that the weight may be made as light as possible and the tooth space for cells in a use device can be lessened as much as possible also with the cell used for these.

[0003] In order to meet such a request, polymeric materials are introduced into an electrode, an electrolyte, etc. of a cell, and research and development in thin-shape-izing and the lightweight-ized various polymer batteries is done in the shape of a sheet etc. As a typical example of such a polymer battery, although a lithium-polymer battery is mentioned, a laminated film is used for the container for cells which serves as the sheathing material for thin-shape-izing of the cell itself, and lightweight-izing also in a lithium-polymer battery, and thin-shape-izing and lightweight-ization are attained.

[0004] When using a laminated film for the container for cells of such a polymer battery, and as the gestalt and operation A laminated film for example, in the Mikata seal format, a four-way-type seal format, a pyro pouch format, etc. While an end manufactures bags to saccate [which carries out opening] and contains the component of a cell inside the approach of extending an electrode terminal outside through opening from the interior, closing the opening by heat adhesion, and forming a cell -- or While fabricating a laminated film in the thin tray-like container which equipped the perimeter with the flange and containing the component of a cell to the crevice, an electrode terminal is extended outside from the interior and the upper part is covered by the lid material of a laminated film, and by the flange, heat adhesion is carried out, it seals, and there is the approach of forming a cell etc.

[0005] The resistance and the barrier nature of a steam and others to various kinds of reinforcement, the electrolytic solution, others, an acid, etc., heat sealability, and the configuration that various engine performance, such as a heat adhesive property with an electrode terminal, is still more nearly required, and carried out the laminating of a base material layer, an aluminum foil layer, an interlayer, and the heat adhesive property resin layer to order from the outside as configurations of a laminated film are taken with the thinness and lightness by the laminated film used for such a container for cells.

[0006] The independent film of either for example, biaxial extension polyester film or a biaxial extension nylon film or the laminated film which carried out the laminating of both with the dry lamination process etc. can be used for the above-mentioned base material layer, and a layer with either polypropylene or independent acid denaturation polypropylene or the compound layer which carried out the laminating of both suitably can be suitably used also in polyolefine system resin at the middle class at a biaxial extension polyethylene terephthalate film etc. and a heat adhesive property resin layer.

[0007] Also in said engine-performance side, the container for cells of high performance can be considerably obtained using the laminated film of such a configuration with a thin shape by producing the container for cells of the above bag formats or a tray format. However, even when, as for the case of a lithium-polymer battery etc., a cell used the above containers for cells, in order that moisture trespasses upon the interior little by little, this might react with an electrolyte component (lithium salt), hydrogen fluoride might be generated and this hydrogen fluoride might invade the inside of an aluminum foil layer through a heat adhesive property resin layer and an interlayer, the problem which makes that adhesion side exfoliate was between long periods of time.

[0008]

[Problem(s) to be Solved by the Invention] The problem of such moisture transparency of a minute amount was what cannot solve the steam transmittance of the wall surface of the container for cells, i.e., the flat-surface section of a laminated film, as for 0, but originates in the end face not being completely intercepted by the aluminum foil layer in

the heat-sealing section of the edge section of a laminated film.

[0009] The place which it is made in order that this invention may solve such a trouble, and is made into the purpose In the thin container for cells with which an aluminum foil layer heat seals the laminated film by which the laminating was carried out as a barrier layer of a steam and others, and is formed While raising the steam barrier nature of the end face of the heat-sealing section as much as possible, having the barrier nature of an advanced steam and advanced others and excelling also in the resistance over the electrolytic solution, hydrogen fluoride, etc. It also has a moldability to the shape of a good heat adhesive property and a tray etc., and is in offering the container for cells excellent in the engine performance which can be used suitable also for sheathing, such as a severe lithium-polymer battery of the demand to various kinds of engine performance.

[0010]

[Means for Solving the Problem] The above-mentioned technical problem is solvable with the following this inventions. At least invention indicated to claim 1 Namely, the base material layer from an outside, an aluminum foil layer, In the container for cells which heat seals superposition and its edge section to saccate, and is formed in the laminated film with which it comes to carry out the laminating of an interlayer and the heat adhesive property resin layer to order so that these heat adhesive property resin layers may counter The interlayer inside the aluminum foil layer of this laminated film is removed. The inside of an aluminum foil layer It is formed in an adhesives layer and a heat adhesive property resin layer, and the thickness of the heat adhesive property resin layer of the heat-sealing section of the edge section of this laminated film is compressed with heat sealing, and it consists of a container for cells characterized by being formed so that it may become thinner than the thickness before heat sealing.

[0011] When forming the inside of the above-mentioned aluminum foil layer in an adhesives layer and a heat adhesive property resin layer, a heat adhesive property resin layer is beforehand produced in the shape of a film, and the approach of sticking this with a well-known dry lamination process using the polyurethane adhesive of 2 liquid hardening mold is usually taken. According to this approach, an adhesive property can improve a heat adhesive property resin layer a laminating inside an aluminum foil layer. Moreover, the interlayer inside the aluminum foil layer of said laminated film protects the inside side of an aluminum foil layer, it is prepared in order to raise the safety of the container for cells, and the biaxial extension polyethylene terephthalate film which was usually excellent in reinforcement and thermal resistance as described above is used.

[0012] However, to invasion of the moisture from the end face of the heat-sealing section of the laminated film mentioned above, since each steam transmittance is not 0, it becomes an adverse element rather than the laminating of such an interlayer's film is carried out for example, through an adhesives layer inside an aluminum foil layer.

[0013] Therefore, it sets to the end face of the heat-sealing section of the edge section of

the laminated film which forms the container for cells by taking the above configurations. The inside of the aluminum foil layer of both sides is formed only in an adhesives layer and a heat adhesive property resin layer. And since it is formed so that the thickness of the heat adhesive property resin layer of the heat-sealing section may be compressed with heat sealing and may become thinner than the thickness before heat sealing. The cross section between the aluminum foil layers of the both sides in this heat-sealing section can become small, the moisture transparency from this part can be lessened, and the barrier nature of the steam and others of the container for cells can be raised further. Moreover, since thickness of a laminated film can be made thin by removing an interlayer, it is effective also to thin-shape-izing of the container for cells.

[0014] Invention indicated to claim 2 is a container for cells according to claim 1 characterized by removing further the adhesives layer inside the aluminum foil layer of said laminated film, and forming the inside of an aluminum foil layer in the heat adhesive property resin layer.

[0015] Although the adhesives layer inside the above-mentioned aluminum foil layer, i.e., 2 liquid hardening mold polyurethane system adhesion agent layer, is excellent in the adhesive property, it is not necessarily good in respect of dampproofing. Therefore, by removing an adhesives layer, the cross section between the aluminum foil layers of the both sides of the heat-sealing section can be made still smaller, and the steam transmittance from the part (end face) can be made still smaller. In order to remove free and the above-mentioned adhesives layer, it is necessary to change the laminating approach of a heat adhesive property resin layer, and a laminating can be carried out by the well-known heat lamination process or the extrusion coat method in that case.

[0016] Since the steam transmittance from the end face inside the aluminum foil layer of the both sides in the heat-sealing section of the edge section of a laminated film can be made still smaller in addition to the operation effectiveness of invention indicated to said claim 1 by taking such a configuration, the barrier nature of the steam and others of the container for cells can be raised further.

[0017] It consists of a container for cells according to claim 1 or 2 with which, as for invention indicated to claim 3, the heat adhesive property resin layer of said laminated film is characterized by being formed in the independent layer of polypropylene or acid denaturation polypropylene, or both compound layer.

[0018] Although various kinds of polyolefine system resin can be used for a heat adhesive property resin layer, when contents-proof physical properties, i.e., the resistance over the electrolytic solution containing an electrolyte etc., besides dampproofing are taken into consideration, polypropylene or especially acid denaturation polypropylene is suitable. Since acid denaturation polypropylene is excellent also in the heat adhesive property over a metal besides [selves] a heat adhesive property. When the laminating of the heat adhesive property resin layer is carried out inside an aluminum foil layer by the heat lamination process or the extrusion

coat method, Even when the front face of an electrode terminal in which the adhesive property over an aluminum foil layer is good, and extends outside from the interior for example, of the container for cells, and is prepared is a naked metal, in the edge section of the container for cells, to it and fitness, heat adhesion can be carried out and it can seal.

[0019] While excelling the heat adhesive property resin layer of the innermost layer of a laminated film in a heat adhesive property in addition to the operation effectiveness of invention indicated to said claims 1 or 2 by taking such a configuration, dampproofing is also good, and since it can consider as a much more stable thing also to the electrolytic solution containing an electrolyte, the container for cells excellent in long term stability can be offered.

[0020] Invention indicated to claim 4 is a container for cells according to claim 1 to 3 characterized by the thing of the aluminum foil layer of said laminated film done for the chromate treatment of the inside field at least.

[0021] The above-mentioned chromate treatment is phenol resin, a phosphoric acid, and chromic fluoride (III). After applying the water solution of a compound by the roll coat method etc., coat formation is heated and carried out so that the temperature of aluminium foil may become 170-200 degrees C. Since the resistance over the hydrogen fluoride which originates in the above-mentioned electrolyte by carrying out chromate treatment of the front face of aluminium foil can be raised and also a surface adhesive property improves, the laminating reinforcement at the time of carrying out the laminating of a base material layer or the heat adhesive property resin layer to an aluminum foil layer can be raised. Although such chromate treatment may be carried out only to the field inside an aluminum foil layer, it can also be carried out to the field of both sides.

[0022] Since the hydrogen fluoride-proof nature of the aluminum foil layer of a laminated film and the adhesive property in the case of a lamination improve in addition to the operation effectiveness of invention indicated to said claim 1 thru/or either of 3 by taking such a configuration, interlaminar peeling of a laminated film etc. can be prevented and the container for cells which was further excellent in engine performance, such as long term stability, can be offered.

[0023]

[Embodiment of the Invention] Below, the gestalt of implementation of invention, such as a laminated film used for the container for cells of this invention and its manufacture approach, is explained. As explained previously, the configuration the laminating of ** base material layer, an adhesives layer, an aluminum foil layer, an adhesives layer, and the heat adhesive property resin layer was carried out [configuration] to order or ** base material layer, an adhesives layer, an aluminum foil layer, and a heat adhesive property resin layer can consider from an outside the laminated film used for the container for cells of this invention as the configuration by which the laminating was

carried out to order.

[0024] It is taken in order that such a configuration may raise further the barrier nature of the steam and others of the container for cells. From the inside of the aluminum foil layer of the laminated film used for the conventional container for cells An interlayer or an interlayer, and an adhesives layer (adhesives layer for dry laminates) are removed, and it considers as the configuration to which the laminating of the heat adhesive property resin layer was carried out like the configuration to which the laminating of the heat adhesive property resin layer was carried out through the adhesives layer inside the aluminum foil layer like **, or **. However, in the configuration of **, the adhesives for dry laminates are not used inside an aluminum foil layer, but well-known anchor coat processing or priming-coat processing by heat adhesive property resin layer like acid denaturation polypropylene and affiliated resin can be performed if needed.

[0025] As an example of such priming-coat processing, the laminating side of an aluminum foil layer is thinly coated with the dispersion or the solution of for example, acid denaturation polypropylene. While heating and carrying out welding to a 170-200-degree C elevated temperature after desiccation, by there being a method of making the coat of acid denaturation polypropylene form, and performing such priming-coat processing The laminating of the heat adhesive property resin layers by which a laminating is moreover carried out by the heat lamination process or the extrusion coat method, such as polypropylene and acid denaturation polypropylene, can be carried out firmly.

[0026] In the above-mentioned configuration, although especially limitation is not carried out, it can use biaxial extension polyester film, such as a biaxial extension polyethylene terephthalate film excellent in various kinds of reinforcement and resistance, a biaxial extension polyethylenenaphthalate film, a biaxial extension polybutylene terephthalate film, and a biaxial extension polybutylene naphthalate film, the independent film of a biaxial extension nylon film, or the laminated film that carried out the laminating of these two or more sorts for the base material layer of the outermost layer. In addition, since a moldability is improved when fabricating a laminated film in a tray-like container, draw magnification of the above-mentioned film can be made low, or a copolymerization type polyester system resin film can also be used.

[0027] In order to give the barrier nature of a steam and others to the container for cells, a laminating is carried out, elastic aluminium foil is suitable, but 0.3 to 9.0% of the weight, an aluminum foil layer has much more good plasticity, and also when the aluminium foil which contains iron 0.7 to 2.0% of the weight especially preferably bends or processes press forming etc., it is desirable at the point which can lessen generating of a pinhole. Moreover, as for an aluminum foil layer, it is desirable to perform the above chromate treatment to the field of the inside or the field of both sides. When producing the container for cells in a bag format, 20-30 micrometers is suitable

for it, the thickness of an aluminum foil layer has desirable 30 micrometers or more, when producing in the tray format of performing press-forming processing, and 40-50 micrometers is suitable for it.

[0028] Moreover, it is desirable to use the independent layer of polypropylene or acid denaturation polypropylene or both compound layer for the heat adhesive property resin layer of an innermost layer, as explained previously. When considering as a compound layer, it can also consider as 3 lamination which carried out the laminating of the acid denaturation polypropylene layer to the both sides by using as a polypropylene layer, others, for example, an interlayer. [two-layer / of a polypropylene layer and an acid denaturation polypropylene layer] Moreover, about which is chosen among these heat adhesive property resin layers, it is desirable that select what suitable suitably and it carries out a laminating with the laminating approach, the metal of whether the quality of the material of the adhesion side of an electrode terminal, for example, surface coating, is given and nakedness, etc.

[0029] As the above-mentioned acid denaturation polypropylene, unsaturated carboxylic acid, such as an acrylic acid, methacrylic acid, a maleic acid, a maleic anhydride, an anhydrous citraconic acid, an itaconic acid, and itaconic acid anhydride, the polypropylene which carried out graft polymerization denaturation with the anhydride, or the polypropylene with which said acid component blended the polyolefin resin by which copolymerization was carried out can be used. These may be used independently, and may blend and use two or more sorts.

[0030] The approach of carrying out the laminating of such a heat adhesive property resin layer to the field inside an aluminum foil layer How to carry out the laminating of the heat adhesive property resin layer beforehand produced in the shape of a film with a dry lamination process using the adhesives of 2 liquid hardening mold, Or there is an approach of carrying out a laminating only by the heating pressurization called a heat lamination process or the approach of extruding and carrying out the coat of the heat adhesive property resin, and carrying out a laminating by the monolayer or multilayer co-extrusion, without using adhesives, and a laminating can be carried out by any approach. In addition, when carrying out the laminating of the heat adhesive property resin layer by the above-mentioned heat lamination process or the extrusion coat method, an anchor coat or a priming coat can be pretreated to the laminating side of an aluminum foil layer if needed. Moreover, 30-40 micrometers is suitable for the thickness of a heat adhesive property resin layer.

[0031] Below, the typical example of the configuration of the laminated film used for the container for cells of this invention is shown. However, pretreatment of the chromate treatment of aluminium foil etc. is omitted and shown.

(Configuration in the case of using adhesives and carrying out the laminating of the heat adhesive property resin layer with a dry lamination process inside an aluminum foil layer)

- (1) a PET film layer / adhesives layer -- a /aluminum foil layer / adhesives layer / non-extended PP film layer (innermost layer)
- (2) a PET film layer / adhesives layer / aluminum -- a foil layer / adhesives layer / non-extended acid denaturation PP film layer (innermost layer)
- (3) A PET film layer / an adhesives layer / aluminum foil layer / adhesives layer / co-extrusion film layer (PP layer / acid denaturation PP layer) (innermost layer)
- (4) A PET film layer / an adhesives layer / aluminum foil layer / adhesives layer / co-extrusion film layer (an acid denaturation PP layer / PP layer / acid denaturation PP layer) (innermost layer)
- (5) an on-film layer / adhesives layer -- a /aluminum foil layer / adhesives layer / non-extended PP film layer (innermost layer)
- (6) an on-film layer / adhesives layer / aluminum -- a foil layer / adhesives layer / non-extended acid denaturation PP film layer (innermost layer)
- (7) An on-film layer / an adhesives layer / aluminum foil layer / adhesives layer / co-extrusion film layer (PP layer / acid denaturation PP layer) (innermost layer)
- (8) An on-film layer / an adhesives layer / aluminum foil layer / adhesives layer / co-extrusion film layer (an acid denaturation PP layer / PP layer / acid denaturation PP layer) (innermost layer)
- (9) a PET film layer / adhesives layer /-film layer / adhesives layer -- a /aluminum foil layer / adhesives layer / non-extended PP film layer (innermost layer)
- (10) a PET film layer / adhesives layer /-film layer / adhesives layer / aluminum -- a foil layer / adhesives layer / non-extended acid denaturation PP film layer (innermost layer)
- (11) A PET film layer / adhesives layer / on-film layer / an adhesives layer / aluminum foil layer / adhesives layer / co-extrusion film layer (PP layer / acid denaturation PP layer) (innermost layer)
- (12) A PET film layer / adhesives layer / on-film layer / an adhesives layer / aluminum foil layer / adhesives layer / co-extrusion film layer (an acid denaturation PP layer / PP layer / acid denaturation PP layer) (innermost layer)

Although which configuration is mentioned, it is not limited to these and various configurations can be taken.

[0032] In the above, all adhesives layers are the adhesives for dry laminates, in a PET film, a biaxial extension polyethylene terephthalate film and an on-film show a biaxial extension nylon film, and PP shows polypropylene, and the co-extrusion film of an innermost layer is a non-oriented film. And when carrying out the laminating of the heat adhesive property resin layer of an innermost layer, without preparing an adhesives layer inside an aluminum foil layer, the knockout coat methods, such as a heat lamination process, a monolayer, or multilayer co-extrusion, etc. can be taken. In that case, priming coats, well-known anchor coats, etc., such as said acid denaturation polypropylene, can be given inside an aluminum foil layer if needed. When taking the knockout coat method, said co-extrusion film layer turns into a co-extrusion resin layer,

but when other configurations take said which laminating approach, the adhesives layer inside an aluminum foil layer is removed, and also since it is the same, a publication is omitted.

[0033]

[Example] Hereafter, this invention is explained still more concretely using a drawing. However, this invention is not limited to these drawings. Moreover, the sign given to the drawing used the same sign for the part of the same name also in a different drawing. [0034] Drawing 1 and drawing 2 are the type section Figs. showing the configuration of one example of the laminated film used for the container for cells of this invention, respectively. Drawing 3 is the type section Fig. showing the configuration of the laminated film used for the conventional container for cells. Drawing 4 is the ** type top view showing the configuration of one example of the container for cells of this invention. Moreover, drawing 5 is the expanded sectional view of the A-A line of the container for cells shown in drawing 4. Drawing 6 is the type section Fig. showing the configuration of one another example of the container for cells of this invention. Drawing 7 is the perspective view showing the configuration of an example of the cell produced using the container for cells of this invention.

[0035] When the container for cells was conventionally produced with a laminated film, the laminated film of a configuration as shown in drawing 3 was used. Namely, the laminated film 70 for cells shown in drawing 3. The base material layer 1 from an outside (it sets to drawing and is the bottom), adhesives layer 4a, the aluminum foil layer 2, and adhesives layer 4b, It is the configuration that the laminating of an interlayer 5, adhesives layer 4c, and the heat adhesive property resin layer 3 was carried out to order. The laminated film of such a configuration is manufactured to saccate [in which an end carries out opening in for example, the Mikata seal format, a four-way-type seal format, or a pyro format]. The container for cells was produced in the format which fabricates a collar-head tray-like container with the shallow depth by press forming etc., and is heat sealed by the flange combining the lid material by the laminated film of the same configuration as this.

[0036] However, since the laminating of the aluminum foil layer 2 is carried out inside the base material layer 1 when the container for cells is produced with the laminated film of such a configuration there is especially no steam transmittance of the thickness direction of laminated films, such as the wall surface section of the container for cells, as long as there is no defect of a pinhole etc., although it can be made (0) In the end face of the heat-sealing section of the edge section of the container for cells Between the aluminum foil layers 2 of both sides, it is placed between duplexes by adhesives layer 4b, an interlayer 5, adhesives layer 4c, and the heat adhesive property resin layer 3, and since that cross section was also large, there is invasion of the moisture from this part and the barrier nature of the steam and others of the container for cells was reduced as a result.

[0037] Therefore, in the end face of the heat-sealing section of the edge section of said container for cells, while changing the lamination inside the aluminum foil layer of a laminated film so that the distance between the aluminum foil layers of the laminated film of both sides may be contracted as much as possible and the cross section can be made small, in the case of heat sealing, a heat adhesive property resin layer be compressed in the possible range, and the thickness become thin, it heat seal, and the container for cells consist of this inventions.

[0038] The laminated film used for the container for cells of such this invention can be constituted as shown in drawing 1 and drawing 2 . That is, the laminated film 50 for cells shown in drawing 1 carries out the laminating of the base material layer 1, adhesives layer 4a, the aluminum foil layer 2, adhesives layer 4b, and the heat adhesive property resin layer 3 to order, and constitutes them from an outside (it sets to drawing and is the bottom). It sets in the configuration of the laminated film 70 used for the conventional container for cells shown in drawing 3 , and this configuration is the interlayer 5 inside the aluminum foil layer 2, and adhesives layer 4c. It removes and is adhesives layer 4b to the inside of the aluminum foil layer 2. It is the configuration which minded and carried out the laminating of the heat adhesive property resin layer 3. In addition, in this invention, it is desirable to perform the above chromate treatment to the field inside the aluminum foil layer of a laminated film (heat adhesive property resin layer 3 side) or the field of both sides.

[0039] moreover, the configuration of the laminated film shown in said drawing 3 and drawing 1 -- setting -- adhesives layer 4a, 4b, and 4c **** -- 2 liquid hardening mold polyurethane adhesive for dry laminates is used, the thickness is about 3 micrometers, and the biaxial extension polyethylene terephthalate film with a thickness of about 12 micrometers is usually used for the middle class. Therefore, as compared with the case where the laminated film 70 of the conventional configuration shown in drawing 3 is used, a total (thickness) of 30 micrometers of spacing between the aluminum foil layers of the both sides of the heat-sealing section can be made small by producing the container for cells using the laminated film 50 of a configuration of having been shown in drawing 1 .

[0040] The laminated film 60 for cells shown in drawing 2 carries out the laminating of the base material layer 1, adhesives layer 4a, the aluminum foil layer 2, and the heat adhesive property resin layer 3 to order, and constitutes them from an outside (it sets to drawing and is the bottom). It sets in the configuration of the laminated film 50 for cells shown in said drawing 1 , and this configuration is adhesives layer 4b further from the inside of the aluminum foil layer 2. It is the configuration which removed and carried out the laminating of the heat adhesive property resin layer 3 inside the aluminum foil layer 2.

[0041] Although it is necessary to change the laminating approach of the heat adhesive property resin layer 3 into a heat lamination process or the extrusion coat method as

explained previously when taking such a configuration By producing the container for cells using the laminated film 60 of such a configuration, a total (thickness) of about 6 micrometers of spacing between the aluminum foil layers of the both sides in the heat-sealing section can be further made smaller than the case where the laminated film 50 of a configuration of having been shown in said drawing 1 is used. Therefore, since steam transmittance [that the interlayer and adhesives layer which were removed in each are involved as compared with the case where the laminated film 70 of the conventional configuration is used by taking a configuration like the laminated films 50 and 60 shown in drawing 1 and drawing 2] can be made small, the barrier nature of the steam and others of the container for cells using it can be raised gradual further, respectively.

[0042] Drawing 4 is the ** type top view showing the configuration of one example of the container for cells of this invention, and drawing 5 is the expanded sectional view of the A-A line of the container for cells shown in drawing 4 . The container 100 for cells shown in drawing 4 is constituted as a bag-shaped container of a four-way-type seal format, and constitutes the container 100 for cells as a bag-shaped container in which piles up using the laminated films 50 and 60 for cells of a configuration as shown in said drawing 1 or drawing 2 so that the heat adhesive property resin layers may counter, and heat seals the edge section of perimeter Mikata in the heat-sealing section 6, and an end carries out opening by opening 10.

[0043] Although the laminated film separated separately can also be used for the laminated film of both sides when producing the container for cells in such a four-way-type seal format, like the case where the bag of the Mikata seal format is produced, the laminated film of one sheet can be rigged and the container for cells of a four-way-type seal format can be produced by the approach of the bent edge section also heat sealing. Since the cutting plane of a laminated film is lost at the end turned up by taking such an approach, the steam transparency from the end face of the heat-sealing section can be lessened, and the barrier nature of the steam and others of the container for cells can be raised further.

[0044] When producing a cell using such a container 100 for cells, after inserting the component of a cell from opening 10 and extending an electrode terminal outside through opening 10 from the interior, a thin cell is producible by heat sealing and sealing opening 10 with an electrode terminal. Moreover, by not forming beforehand the bag-shaped container in which an end which was not necessarily illustrated carries out opening, for example, preparing the restoration sealing device of dedication, when forming the container for cells in a four-way-type seal format The component of a cell is arranged to the inside side of the laminated film for cells which forms one wall surface. After extending an electrode terminal outside from an end, the edge section of a perimeter four way type can be heat sealed to serial or coincidence in piles, the laminated film which forms another wall surface on it can be sealed, and a thin cell can

also be produced.

[0045] Moreover, with the container for cells of this invention, in case the edge section of a laminated film is heat sealed and the container for cells is formed further, it is characterized by being formed so that the thickness of the heat adhesive property resin layer of the heat-sealing section may be compressed with heat sealing and may become thinner than the thickness before heat sealing. therefore, with the container 100 for cells shown in [drawing 4](#) In case the edge section and opening 10 of perimeter Mikata are heat sealed, as the expanded sectional view of the A-A line of the container 100 for cells of [drawing 4](#) was illustrated to [drawing 5](#) , the cross-section configuration of the heat-sealing section neighborhood The thickness T2 in the heat-sealing section 6 of the heat adhesive property resin layer 3 of a laminated film 60 is the thickness T1 (however, since it is not compressed with heat sealing, the thickness T1 of the heat adhesive property resin layer of parts other than heat-sealing section 6) before heat sealing, as the thing equivalent to the thickness before heat sealing -- having been shown -- it becomes thin -- as -- $T1 > T2$ [namely,] It heat seals so that it may become.

[0046] The numeric value which can actually make thin thickness of the heat adhesive property resin layer of the above-mentioned heat-sealing section can be made thin to 80 - 40% of the thickness before heat sealing, although it is not uniform in order to change with the thickness of an electrode terminal etc. further, the thickness of a heat adhesive property resin layer from the first and the location (the location between which it is placed by the electrode terminal, and location not intervening) of the heat-sealing section, and. This point is the same even when it changes into the gestalt which consists of a collar-head tray-like container as shows the gestalt of the container for cells to following [drawing 6](#) , and lid material.

[0047] The container 200 for cells which [drawing 6](#) is the type section Fig. showing the configuration of one another example of the container for cells of this invention, and was shown in [drawing 6](#) consists of a collar-head tray-like container 7 produced by press forming and flat lid material 9 put on it, and is produced with the laminated film 50 for cells or the laminated film 60 for cells of a configuration of having been shown in said [drawing 1](#) or [drawing 2](#) , respectively. Moreover, the depth of the tray-like container 7 is usually an about 3-5mm shallow gestalt.

[0048] After such a container 200 for cells equips the shaping crevice of the collar-head tray-like container 7 with the component of a cell and extends an electrode terminal outside from the interior, it can produce a thin cell by putting the lid material 9 on the upper part, and heat sealing both by the surrounding flange 8. Since such a container 200 for cells of a format can perform the component of a cell, and wearing of an electrode terminal from the upper part of the collar-head tray-like container 7 which carried out opening greatly, the process at the time of producing a cell is simplified, and it can raise the productivity.

[0049] In addition, although the collar-head tray-like container 7 and the lid material 9

considered this container 200 for cells as 2 piece configurations separated separately, the collar-head tray-like container 7 and the lid material 9 can also consider it as 1 piece configuration connected in the shape of a hinge in the end of a flange 8. Since a laminated film is turned up for the direction of 1 piece configuration in the hinge-like connection section and a cutting plane is rather lost into this part, the steam transparency from an end face can be lessened and the barrier nature of the steam and others of the container for cells can be raised further. Furthermore, since the lid material 9 may also be fabricated not in a flat configuration but in the same configuration as the collar-head tray-like container 7 and the depth of a shaping crevice can be made shallow in that case one half, there is an advantage which can make thin thickness, such as an aluminum foil layer of a laminated film.

[0050] Drawing 7 is the perspective view showing the configuration of an example of the cell produced using the container for cells of this invention. However, since the cell itself was a thin shape, the thickness was omitted and shown. Moreover, while drawing 7 is effective as a perspective view of the cell produced using the container 100 for cells shown in said drawing 4, it is effective also as a perspective view of the cell produced using the container 200 for cells shown in said drawing 6.

[0051] Therefore, the cell 500 shown in drawing 7 is explained as what was produced for the time being using the container 200 for cells shown in said drawing 6. The container 200 for cells shown in said drawing 6 is used for such a thin cell 500. It equips with the component of a cell into the shaping crevice of the collar-head tray-like container 7. It lets the flange 8 top of an end pass from the interior, and they are electrode terminal 11a of a positive electrode and a negative electrode, and 11b to an outside. After extending, the lid material 9 can be put on the upper part, and it can produce by heat sealing both, surrounding flange 8 6, i.e., heat-sealing section.

[0052] [Performance evaluation] In order to evaluate the engine performance of the container for cells of this invention, the container for cells of an example 1, an example 2, and the example 1 of a comparison was produced as follows, and comparative evaluation of the steam barrier nature and airtightness (loss in quantity by transparency of the electrolytic solution) was measured and carried out by the following approach.

[0053] (Example 1)

The configuration of the laminated film used for the container for cells (it is equivalent to the configuration shown in drawing 1)

a biaxial extension nylon film (25 micrometers in thickness) / adhesives -- a layer (3 micrometers in thickness) / aluminum foil layer (50 micrometers in thickness) / adhesives layer (3 micrometers in thickness) / non-extended polypropylene film (30 micrometers in thickness)

The above-mentioned aluminum foil layer carries out chromate treatment to the both sides, and using 2 liquid hardening mold polyurethane adhesive, sticks each class on each adhesives layer, and constitutes it from a dry lamination process in it. While

turning up the film at the pars basilaris ossis occipitalis using the above-mentioned laminated film with a dimension, die length of 100mm, and width of face of 55mm, the both-sides edge section was heat sealed by 5mm width of face, the bag-shaped container of the Mikata seal format in which the upper part carries out opening was produced, and it considered as the container for cells of an example 1. In addition, on the occasion of the above-mentioned heat sealing, to 66 micrometers in front of a seal, it compressed and the distance between the aluminum foil layers of the both sides of the heat-sealing section heat sealed after the seal so that it might be set to 30 micrometers.

[0054] (Example 2)

The configuration of the laminated film used for the container for cells (it is equivalent to the configuration shown in [drawing 2](#))

The priming coat (2 micrometers in thickness) / non-extended polypropylene film by the biaxial extension nylon film (25 micrometers in thickness) / adhesives layer (3 micrometers in thickness) / aluminum foil layer (50 micrometers in thickness) / acid denaturation polypropylene (30 micrometers in thickness)

The above-mentioned aluminum foil layer carries out chromate treatment to the both sides, and after it gives the priming coat of acid denaturation polypropylene to the inside side of lamination and an aluminum foil layer for a biaxial extension nylon film and aluminium foil with a dry lamination process at an adhesives layer using 2 liquid hardening mold polyurethane adhesive, on it, with a non-extended polypropylene film, the laminating of it is carried out and it constitutes it from a heat lamination process. While turning up the film at the pars basilaris ossis occipitalis like said example 1 using the above-mentioned laminated film with a dimension, die length of 100mm, and width of face of 55mm, the both-sides section was heat sealed by 5mm width of face, the bag-shaped container of the Mikata seal format in which the upper part carries out opening was produced, and it considered as the container for cells of an example 2. Also in this case, on the occasion of heat sealing, to 64 micrometers in front of a seal, it compressed and the distance between the aluminum foil layers of the both sides of the heat-sealing section heat sealed after the seal so that it might be set to 30 micrometers.

[0055] (Example 1 of a comparison)

The configuration of the laminated film used for the container for cells (it is equivalent to the configuration of the conventional laminated film shown in [drawing 3](#))

A biaxial extension polyethylene terephthalate film (12 micrometers in thickness) / adhesives layer (3 micrometers in thickness) / aluminum foil layer (20 micrometers in thickness) / adhesives layer (3 micrometers in thickness) / a biaxial extension polyethylene terephthalate film (6 micrometers in thickness) / adhesives layer (3 micrometers in thickness) / non-extended polypropylene film (50 micrometers in thickness)

Using 2 liquid hardening mold polyurethane adhesive, each class is stuck on each above-mentioned adhesives layer, and consists of dry lamination processes in it. Using

the above-mentioned laminated film, with the same dimension as said examples 1 and 2, the bag-shaped container of the Mikata seal format was produced similarly, and it considered as the container for cells of the example 1 of a comparison. In this case, as a distance between the aluminum foil layers of both sides, it compressed and after the seal was heat sealed to 124 micrometers in front of a seal, so that it might be set to 74 micrometers, so that, as for heat sealing, the thickness of the heat adhesive property resin layer of the heat-sealing section might become about 50% in front of a seal according to said example.

[0056] [Measurement of steam barrier nature and its result] The container for cells of the examples 1 and 2 produced as mentioned above and the example 1 of a comparison is made into a sample. To each, as the electrolytic solution Ethylene carbonate (EC), dimethyl carbonate (DMC), the constant temperature of 60 degrees C after enclosing at a time 3g of mixed liquor which mixed diethyl carbonate (DEC) by the ratio of a volume ratio 1:1:1, and 90%RH -- it saved for seven days with the constant humidity chamber, and the following results were obtained when the moisture content contained in the electrolytic solution after preservation was measured with the Karl Fischer technique. In addition, heat sealing of opening after the above-mentioned mixed liquor impregnation extended and heat sealed the seal width to 15mm width of face so that the steam transparency from this part could be disregarded, in order to lessen variation on actuation.

As opposed to the moisture content of the mixed liquor enclosed with the container for cells of the example 1 of a comparison which is the conventional container for cells having been 1000 ppm so that clearly from the above-mentioned result The moisture contents of the mixed liquor enclosed with the container for cells of an example 1 are 400 ppm and 1/2 or less [of those], and the moisture contents of the mixed liquor enclosed with the container for cells of an example 2 are 85 ppm and 1/10 or less [of those], and the steam barrier nature of the container for cells of an example was improving remarkably.

[0057] [Airtight measurement and its result] The same sample as the sample used for measurement of said steam barrier nature enclosed [electrolytic-solution] was prepared independently, it saved for seven days at the 85-degree C thermostat, the weight change before and behind that (loss in quantity) was measured, and airtight comparative evaluation was performed.

As opposed to weight change of the container for cells of the example 1 of a comparison which is the conventional container for cells also in the airtightness of the container for cells having been -0.0333g so that clearly from the above-mentioned result The containers for cells of an example 1 were decreasing in number to 2 by about 1/with -0.0170g, further, with the container for cells of an example 2, it decreased to -0.0070g and about 1/5, and the airtight improvement with large all was accepted.

[0058]

[Effect of the Invention] As mentioned above, as explained in detail, according to this invention, the component of a cell is contained inside. While being the container for cells used in order to form a cell, having the barrier nature of a steam and others it is thin and light and advanced and excelling also in the resistance over the electrolytic solution, hydrogen fluoride, an acid, etc. It also has good heat scalability and the effectiveness that the container for cells which can be used suitable also for containers, such as a severe lithium-polymer battery of a demand, to various kinds of engine performance can be offered with sufficient productivity is done so.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the type section Fig. showing the configuration of one example of the laminated film used for the container for cells of this invention.

[Drawing 2] It is the type section Fig. showing the configuration of one another example of the laminated film used for the container for cells of this invention.

[Drawing 3] It is the type section Fig. showing the configuration of the laminated film used for the conventional container for cells.

[Drawing 4] It is the ** type top view showing the configuration of one example of the

container for cells of this invention.

[Drawing 5] It is the expanded sectional view of the A-A line of the container for cells shown in drawing 4.

[Drawing 6] It is the type section Fig. showing the configuration of one another example of the container for cells of this invention.

[Drawing 7] It is the perspective view showing the configuration of an example of the cell produced using the container for cells of this invention.

[Description of Notations]

1 Base Material Layer

2 Aluminum Foil Layer

3 Heat Adhesive Property Resin Layer

4a 4b and 4c Adhesives layer

5 Interlayer

6 Heat-Sealing Section

7 Collar-Head Tray-like Container

8 Flange

9 Lid Material

10 Opening

11a 11b Electrode terminal

T1 Thickness of the heat adhesive property resin layer before heat sealing

T2 Thickness of the heat adhesive property resin layer after heat sealing

50, 60, 70 Laminated film for cells

100,200 Container for cells

500 Cell